

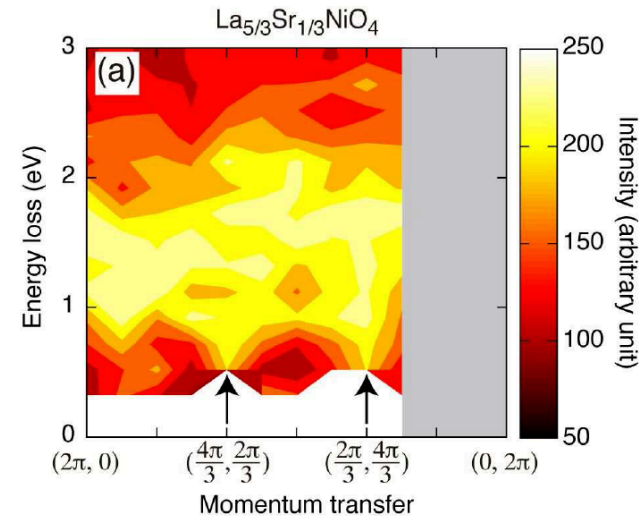
Hard Inelastic X-ray Scattering (HIX)

HIX at NSLS-II

- Will provide 10 meV (H-REX) and 200 meV (I-REX) energy resolution with excellent focusing, best of its kind in the world
- High brightness of NSLS-II and multiple-analyzer system will allow measurement time comparable to current lower resolution instruments
- Will capitalize on the recent development efforts of sapphire and quartz analyzers

Examples of Science Areas & Impact

- **CONDENSED MATTER PHYSICS:** Measurement of novel collective excitations in strongly correlated materials: orbitons, magnons, spinons, etc.
- **CLEAN ENERGY:** *In-situ* x-ray Raman scattering study of chemical changes in fission materials, battery materials, and solar cells
- **ENVIRONMENT:** *In-situ* studies of supercritical CO₂ for carbon sequestration
- **EARTH and PLANETARY SCIENCES:** Study of matter in extreme conditions: pressures up to 300 GPa and temperatures of 3-6000 K



Momentum dependence of charge excitations in La_{5/3}Sr_{1/3}NiO₄, measured with Cu K edge RIXS. This measurement was done at 30ID (MERIX) at the Advanced Photon Source with the energy resolution of 130 meV. HIX will enable study of electronic excitations at much lower energy scale for much wider range of materials: Wakimoto et al. Phys. Rev. Lett. 102 157001 (2009).

Beamline Capabilities

TECHNIQUE(S): resonant and non-resonant inelastic x-ray scattering; x-ray Raman Scattering

SOURCE: undulator (high β)

ENERGY RANGE: 2.9 keV – 15 keV

RESOLUTION: 10 meV (H-REX); 200 meV (I-REX)